1. A coin with diameter 3.0cm rolls up a 30° inclined plane. The coin starts out with an initial angular speed of 60 rad/s and rolls in a straight line without slipping. If the moment of inertia of the coin is \( \frac{1}{2}MR^2 \), how far will the coin roll up the inclined plane?

\[
distance \text{ up the inclined plane} = \frac{1}{2}I\omega^2 + \frac{1}{2}mv^2
\]

Solution:

\[
mgh = mg l \sin \theta = \frac{1}{2}J\omega^2 + \frac{1}{2}mv^2
\]

where \( v = \omega R \). So, substituting for \( v \) and solving for \( l \) yields:

\[
l = \frac{\frac{1}{2}M 0.015^2 60^2 + \frac{1}{2}M (60 0.015)^2}{M 9.8 \sin 30°} = 0.124m
\]

2. A 3.00-kg particle is located on the x axis at \( x = -5.00m \) and a 4.00-kg particle is located on the x axis at \( x = 3.00m \). Find the center of mass of this two particle system.

\[
\text{co-ordinates of center of mass} = -0.429m
\]

Solution:

\[
x_{CM} = \frac{(3.00kg)(-5.00m) + (4.00kg)(3.00m)}{3.00kg + 4.00kg}
\]

\[
= -0.429m
\]